INVESTIGATOR'S ANNUAL REPORT

National Park Service

All or some of the information provided may be available to the public

Reporting Year: 1994	**Park:** Shenandoah NP
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Additional investigators or key field assistants (first name, last name, office phone, office email):

No co-investigators

Permit#:
SHEN1994AJLS

Park-assigned Study Id. #:
unknown

Project Title:
Mechanisms Controlling Variation in Stream Chemical Composition During Hydrologic Episodes in the Shenandoah National Park, Virginia

Permit Start Date: Jan 01, 1998	**Permit Expiration Date** Jan 01, 1998
Study Start Date: Jan 01, 1992	**Study End Date** Jan 01, 1993

Study Status:
Completed

Activity Type:
Other

Subject/Discipline:
Water / Hydrology

Objectives:
To document episodic acidification occurring in SNP with variations due to differing geologic bedrock.

Findings and Status:
Acid deposition is widely believed to have contributed to the episodic acidification of some freshwater systems in the northeastern United States, Canada and Europe. This study investigated losses of acid neutralizing capacity (ANC) and changes in several other chemical constituents during storm events in the Shenandoah National Park. Two parts were included in this study: an historical analysis (1988-1991) of data from the Shenandoah Watershed Study (SWAS) of four catchments: White Oak Run, Shaver Hollow, Deep Run and Madison Run; and a field experiment in 1992 at White Oak Run and Shaver Hollow. The historical analysis used weekly stream samples previously collected by SWAS personnel and the field study samples were collected during actual storms. Both parts of this study then analyzed the data with the Response Sector Model, Ion-ANC Ratio Analysis, and Principal Components Analysis. Both parts of the study found that acid anion flushing was the predominanat acidification mechanism during episodic acidification. Under typical conditions, base cation (Cb) dilution plays a large role also, but to what degree depends largely on the underlying bedrock. Ratios of mean values of delta Cb/delta ANC for Madison Run, Shaver Hollow, White Oak Run, and Deep Run were 0.5, 0.2, 0.3 and -1.4, respectively. These ratios show that the greatest contribution of base cation dilution was at Madison Run, and base cations actually increased at Deep Run. During 1992, gypsy moth defoliation in parts of Shenandoah National Park appeared to alter the mechanisms of episodic acidification at White Oak Run and Shaver Hollow. Base cations increased during storms and nitrate became a bigger contributor to the acid anion (Ca) flushing effect. These studies also found that streams with higher baseflow ANC had greater decreases in ANC, relative to streams with lower baseflow ANC; these had smaller decreases in ANC, but to a more biologically critical level.

For this study, were one or more specimens collected and removed from the park but not destroyed during analyses?
No

Funding provided this reporting year by NPS: 0	**Funding provided this reporting year by other sources:** 0

Fill out the following ONLY IF the National Park Service supported this project in this reporting year by providing money to a university or college	
Full name of college or university:	**Annual funding provided by NPS to university or college this reporting year:**
n/a	0